TO: Kristie Warr

FROM: Rick Haaker, CHP, CIH

SUBJECT: Review of Las Conchas Fire Work Order 11-07024

DATE: 7/27/2011

This is an update to a memo that was dated 7/20/2011. It clarifies the basis for assigning the data qualifiers JH and JL as described below. Data transmitted prior to 7/26/2011 had the qualifiers JH and JL reversed on a small number of results. Four uranium results were affected in this sample set, being resassigned from JL to JH as indicated in Table 0.

Table 0. Changed Uranium Data Qualifiers

ClientID	Isotope	Assigned Qualfier
A006-110701-0940-1-T01	U-234	JH
A006-110701-0940-1-T01	U-235	JH
A001-110703-0915-1-701	U-238	JH
A006-110701-0940-1-T01	U-238	JH

The XLS format data file referenced as an attachment to this memo corrects these assignments where appropriate. Also this memo transmits additional subsidiary calculations for “Net Concentration” and “Net Concentration Propagated Error.”

The data were reviewed for accuracy, completeness, and any apparent issues. During data review a qualifier “UB” was assigned if the activity result is less than five times the activity result of the method blank. A “UB” qualifier denotes that an analyte is non-detect due to lack of activity relative to a blank concentration. Unused filters from the same lot as the sample filters were used as the method blank. The analytes in Table 1 were detected in the method blank, and all samples are affected.

Table 1. Analytes detected or tentatively detected in the method blank and data qualifiers based on the blank.

Isotope	Assigned Qualfier
TOTAL SR	

U-234	
GROSS ALPHA	J
GROSS BETA	
PU-238	J

Data without a UB qualifier was further reviewed.

A “U” was assigned to the Assigned Qualifier column when result was less than 50% of the MDA. In this case the analytical result was assigned to be one-half of the MDA in the "ValidatedResult" column. The validated result should be considered an upper bound estimate in this case.

A “J” was assigned if the result was between 0.5 of the MDA and the MDA. The validated result is the reported result. The validated result represents an estimated value in this case.

A “JH” or “JL” would be based on percent recovery (the "RadioPercentRec", and “GravPercentRec” columns of the Eberline Services report. Below 70% would result in assignment of a JH to denote that the reported result is estimated with more uncertainty than usual, and with a potential positive bias. Recoveries above 130% would result in assignment of a JL to denote that the reported result is estimated with more uncertainty than usual, and with a potential negative bias.

Table 2 lists samples that exhibited percent recoveries outside of the acceptance range.

Table 2. Samples with recoveries outside of the acceptance range.

Isotope	ClientID	RadioPercentRec	Assigned Qualfier
PU-238	A001-110702-0947-1-701	37.43	UB
PU-239	A001-110702-0947-1-701	37.43	U
PU-238	A001-110703-0915-1-701	60.56	U
PU-239	A001-110703-0915-1-701	60.56	UB
U-234	A001-110703-0915-1-701	61.3	UB
U-235	A001-110703-0915-1-701	61.3	UB
U-238	A001-110703-0915-1-701	61.3	JH
PU-238	A002-110701-1143-1-T01	43.63	U
PU-239	A002-110701-1143-1-T01	43.63	U
PU-238	A002-110703-0952-1-T01	52.81	UB
PU-239	A002-110703-0952-1-T01	52.81	U
PU-238	A003-110701-0916-1-T01	40.14	U
PU-239	A003-110701-0916-1-T01	40.14	U

PU-238	A003-110703-0907-1-T01	51.61	U
PU-239	A003-110703-0907-1-T01	51.61	UB
PU-238	A004-110701-0848-1-T01	41.76	U
PU-239	A004-110701-0848-1-T01	41.76	U
PU-238	A004-110703-0912-1-T01	63.97	U
PU-239	A004-110703-0912-1-T01	63.97	U
AM-241	A005-110703-1030-1-T01	60.05	U
U-234	A006-110701-0940-1-T01	22.6	JH
U-235	A006-110701-0940-1-T01	22.6	JH
U-238	A006-110701-0940-1-T01	22.6	JH

The assigned data qualifiers are found in column “AssignedQualifier”.

The effective air volume for the various analytes of the various air samples in cubic meters are provided in the column “AliquotNetEquiv”.

Note that the blank results are in pCi/m^3. The volume that Eberline Services assigned to the blanks for a given analyte are the average of the effective volumes for the samples in the sample set for that analyte.

Air volumes that were collected in this sample set were in the range of 195 to 832 cubic meters.

The period of time between collection of air samples and gross alpha/beta counting was eight to nine days, so those results are unlikely to include an activity contribution due to the presence of radon daughters.

Two samples in the EDD each had two different sample dates. The sample dates for these two samples need to be corrected to 7/3/2011 before the data is loaded into SCRIBE. The affected samples are:

- A001-110703-0915-1-701, and
- A002-110703-0952-1-T01.

No discrepancies were found in the transcription of sample IDs or sample volumes from the chain of custody to the EDD.

One sample, A006-110701-0940-1-T01, requires discussion owing to the JH assignment for U-234, U-235, and U-238. This sample exhibited a low recovery of the U-232 tracer as well as exceeding the detection criteria. It was discussed with the Eberline Services laboratory manager. He reviewed the uranium alpha spectrum for this sample and had the impression that spectral degradation had

occurred, perhaps due to unwanted mass being present in the prepared sample. In other words, the sample preparation for this sample may not have been satisfactory and this sample result may be unreliable.

Net Concentration

Eberline Services reported concentration and uncertainty results which were corrected for instrument background. They also reported concentration and uncertainty results for the method blank. They did not report "net concentration", which is the sample result minus the result for the method blank, probably because their written procedure does not include that calculation and it was not specified in the Purchase Order. The "Net Concentration" is the concentration result reported by Eberline Services corrected for the contribution of the method blank. The net concentration may be calculated from Eberline Services data as indicated in equation 1.

Equation 1.

Net Concentration = (Result * Sample Volume – Blank Result * Blank Volume)/Sample Volume

In equation 1 the *sample volume* is the sample air volume from the chain of custody times the fraction of the sample filter allocated to the particular analysis. The blank volume is the average of the *sample volumes* for all samples submitted on a particular chain of custody times the fraction of the sample filter allocated to the particular analysis. Negative net concentrations were assigned a concentration of zero after this calculation.

Net Concentration Propagated Error

The propagated errors "Uncertainty" in the Eberline Services EDD are, according to their written procedure, based on a 95% confidence interval. The Net Concentration Propagated Error (NPCE) was calculated as indicated in equation 2.

Equation 2.

$$NPCE = [[(\text{Uncertainty Result} * \text{Sample Volume})^2 + (\text{Uncertainty Blank Result} * \text{Blank Volume})^2]^{0.5})/\text{SampleVolume}$$

The Net Concentration Propagated Error result is in a column entitled ErrorNet in the supplemental excel data file, which is attached.

Minimum Detectable Activity (MDA)

The equations for MDA in the Eberline Services written procedure assume that the count time for the sample and the background counts are the same. The results for background count rate in the EDD appear to be truncated to one significant digit, so it is unlikely the MDA results reported by Eberline Services

can be replicated exactly by an independent calculation.

Percent Recovery of Tracer

The denominators of the concentration result, MDA, and uncertainty equations in the Eberline Services written procedure include a factor for percent recovery of the tracer. The alpha spectroscopy results reported by Eberline Services in the EDD should incorporate this factor.

References

AP-018 Operation of the Alpha Spectroscopy System, Eberline Services Oak Ridge Laboratory Analytical Procedure, October 31, 2010.

Attachment

LasConchas-11-07024.accdb supplement7-27-11.XLS